Wisconsin Highway Research Program
Request for Proposal for

Longitudinal Cracking in Widened Portland Cement Concrete Pavements

Proposals must be submitted
no later than
5 PM (CST), Wednesday, March 2nd, 2011

For further information regarding this RFP
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Wednesday, January 12th, 2011

Researcher Proposal Preparation Guidelines

WHRP Proposal Guidelines are available on the WHRP website (http://www.whrp.org/rfps-and-guidelines.html?current=three&sub=none). Please refer to these instructions in preparation of your response.

I. Background and Problem Statement

Since approximately the early 1990's, the Wisconsin Department of Transportation (WisDOT) has constructed widened concrete pavements with widths of 26 feet for a rural four lane divided and 30 feet for a two lane rural highway. For rural four lane divided highways, the standard pavement section includes the outside lane paved at 14 feet wide. The reasoning behind use of these methods on mainline paving was to reduce the amount of stress and deflection at the pavement edge of the concrete slabs due to tires running near the edge. Subsequent field evaluation found that extension of the additional 2-3 feet paved beyond the normal traffic path was successful in meeting the intended objective. Based on this evaluation, it was assumed that the widened sections would result in additional service life of the concrete pavement and significantly reduce shoulder maintenance. The revised section was also attractive from a safety standpoint because it eliminated the hazard of edge drop off at the edge of the 12 foot lane.

Many of these pavements are approaching 20 years of service life and some are experiencing longitudinal cracking in the slabs. Qualitatively, it appears that while the current pavement section was a success in reducing edge cracking and shoulder maintenance, it may have made the pavement more susceptible to other forms of distress. The department is commissioning a research study to evaluate the performance of these pavements to determine if there has been an increase in longitudinal cracking in concrete pavement due to the use of wider concrete slabs (14' or greater).

II. Objectives

The objective of this study is to evaluate the performance of concrete pavement with wider panels (14' wide or greater) to determine if the frequency of longitudinal cracking in these sections is higher relative to sections of standard width panels (12'to 13'). If increased cracking is observed, the research will quantify the significance of the differences in performance between the increased and standard width panels.

III. Scope of Work

a) **Proposal**

i) Literature Review:
Define the scope for a complete literature search of the topic focused on national trends in longitudinal cracking as it relates to the following:

- Pavement widths
- Guidance recommending maximum allowable pavement width based on pavement thickness

ii) Experimental Plan
Define how they plan to study longitudinal cracking, including

- Potential sources of information and how information will be obtained
- Possible analysis methods that will be used to quantify the problem and determine its significance.

b) **Task 1: Literature Review**
Researcher will conduct a comprehensive literature search on the topic, identifying national trends and patterns, and relating the information to current practices for pavement jointing, widths and slab thickness in Wisconsin. The results of this literature search will be reported back to the Rigid Pavement Technical Oversight Committee (TOC).

c) **Task 2: Development of Experimental Plan for Evaluation of WI Concrete Pavement Performance**
Based on the results of Task 1, the researcher will develop a plan for analyzing Wisconsin's concrete pavement performance as it relates to longitudinal cracking. Specifically, the following subtasks will be performed:
   i) Data Sources:
   Identification of the sources of information that are required to complete the evaluation and how this information will be obtained. Potential sources of information include: WisDOT's Pavement Information Files (PIF), as built plans, and other historic pavement data.
   ii) User Survey:
   Survey of WisDOT regional pavement engineers for example projects, field review, and other relevant information.
   iii) Pavement Evaluation:
   At a minimum, the Pavement Condition Index (PCI) score of the various concrete pavements reviewed will be completed
   iv) Modeling and Analysis:
   Definition, modeling, and analysis of special conditions that may have contributed to an increase in susceptibility to longitudinal cracking on certain projects may be required.

d) **Task 3: Analysis and Reporting**
   i) Statistical analysis methods will be implemented to identify significant trends in performance patterns for both wide and standard concrete pavement panels.
   ii) Reporting: All of the data and other information gathered in Task 1 and 2 will be submitted as a draft final report. Recommendations will include proposed specification adjustments, guidelines for use of wider pavement sections, and any other relevant information. A formal presentation of the project to the Rigid Pavement TOC is also expected as part of the project.

IV. WisDOT/TOC Contribution

a) Expected level of involvement by Staff/TOC Members: The TOC or Project Oversight Committee (POC) will support the research in the following areas:
   i) Review and comment on literature review report submitted at the conclusion of Task 1.
   ii) Assistance in gathering information from WisDOT databases, such as information from the PIF files, and as built plans.
   iii) Identifying and surveying regional pavement engineers for example projects.

b) WisDOT Equipment
   i) Researchers should not assume availability of WisDOT equipment in the proposal. If equipment is donated to the project by WisDOT or another entity, a letter of commitment must be included in the proposal. It is not expected that this project will require the use of any WisDOT equipment.

V. Other Project Requirements

a) Laboratory/Technician Certifications: None
b) Required travel to fulfill TOC Obligations
   i) Travel around Wisconsin may be necessary in order to verify field performance of some of the concrete pavements. Travel to Madison to report the results of the study to the Rigid Pavement TOC in Task 3 is required.

VI. Specific Results, Findings, Tools, etc. (Deliverables)

a) Guidance Documents containing necessary modifications (if shown to be needed).
b) Presentation Requirements. All projects require the PI to give a closeout presentation after submittal of the draft final report.
c) Reporting Requirements. Electronic copy in PDF format and 15 hard copies delivered to WHRP by the contract end date. The researcher is expected to address TOC comments in the final report and deliver in WHRP format.

VII. Budget and Time Frame

a) Project Duration is recommended for 18 months (starting August 1, 2011 and ending January 31, 2012)
   i) Deadline for submittal of the draft final report is October 31, 2012.
   ii) Deadline for submittal of the final report is January 31, 2013.
b) Project Budget shall not exceed $50,000.
c) The researcher is expected to submit the draft final report with quality technical writing and proper grammar. It is acceptable to include a technical editor on the research team to ensure these requirements are met.
d) Matching funds will not be considered in the proposal evaluation process.

VIII. Implementation

a) This study will recommend new concrete paving widths, which will be used by the Department in the Facilities Development Manual, Standard Detail Drawings, and the Standard Specifications for Highway and Structure Construction.
b) Researcher is expected to communicate the following:
   i) Potential changes in practice.
   ii) Benefits in terms of performance and cost savings.
c) Tools to facilitate implementation.